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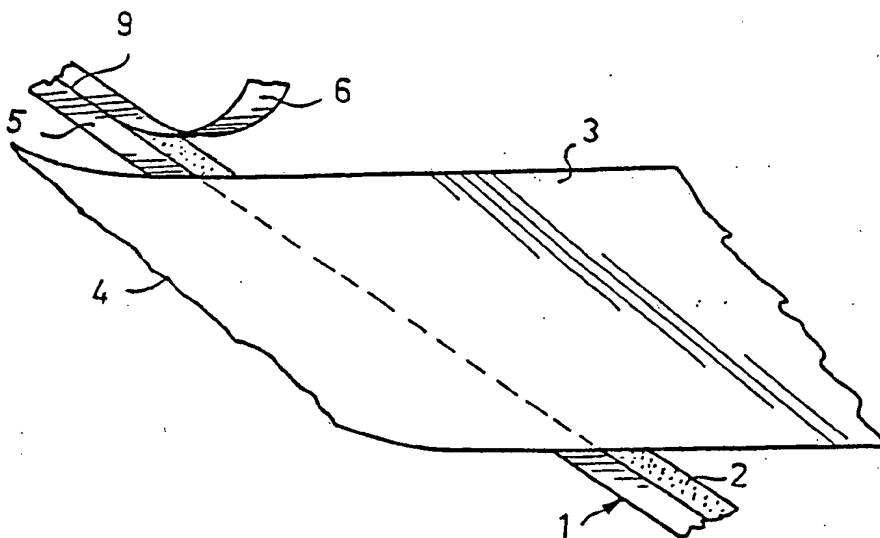
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## Published

With international search report.

With amended claims.

(54) Title: METHOD AND TAPE FOR JOINING PAPER WEBS



## (57) Abstract

This invention relates to a method and tape for joining paper webs. In paper production, a paper web is accidentally broken or cut, in which case the ends are joined together by means of a tape. In the known junction, the ends of the webs are located one on top of the other, and there is a two-sided tape therebetween. On account of faults in work, the paper does not always completely cover the tape, wherefore the junction point in the roll will adhere to the paper on top and underneath, which will result in a web rupture. This disadvantage can be avoided by using one-sided tape (1) whose protective film is divided into two parts (5, 6), whereby a butt joint can be made which involves no danger of sticking.

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## Method and tape for joining paper webs

This invention relates to a method for joining paper webs by means of tapes provided with a protective film, in accordance with which an adhesive surface of a first tape is exposed, said tape is attached substantially transversely to a first web at a distance from the end edge of the web so that it will extend from one longitudinal edge of the web to the other, the end portion of the web between the tape and the end edge of the web is removed, the same steps are repeated for a second web, and the junction point between the webs is covered with a second tape. The invention also relates to a tape used in the method.

After a paper web has been produced it will in general be immediately subjected to re-checks wherein for example holes and impurities are removed from the paper. Thereby the paper web is cut at the defective points and the end edges thus produced are joined together by means of at least one substantially transverse, self-adhesive tape.

According to the most often employed method, the joining is carried out with a two-sided tape. Thereby a two-sided tape furnished with a protective film covering one side is fixed to the first paper web in the vicinity of the end edge thereof, whereafter the part of the web between the tape and the end edge of the web, the so called tail, is torn away by hand along the edge of the tape. Thereafter the protective film on the tape is removed and the other paper web is fixed on top of the tape and the end portion is torn away.

This known method has the disadvantage that the torn end edge of the paper web does not always exactly follow the edge of the adhesive surface of the tape, but the edge may have notches resulting from inaccurate

tearing, on account of which some of the adhesive surface of the tape will appear. This will result in that the junction points on the paper web wound on a roll will adhere to the ply on top and the ply underneath.

5 This can be prevented for the outer side of the junction by covering the junction with a one-sided tape, but a corresponding operation cannot be carried out on the lower side of the junction, since it rests against the previous ply on the roll.

10 Thus the known method explained above has the disadvantage that the paper web will often adhere at the junction at least to the ply of the paper web underneath, wherefore the paper web may be broken when it is removed from the roll. The junction point is also  
15 relatively thick, since there are superimposed therein two layers of paper and one or two layers of tape. The thickness of the web thus changes abruptly at this point, on account of which the printing roll may even be broken as a result of the impact thereupon.

20 The object of this invention is to provide a method for joining paper webs, wherewith a junction is produced which involves no danger of adhesion between the paper plies and which is still equally thin as, or thinner than, the junction produced by the known  
25 method. The method of the invention is characterized in that both paper webs are fixed end to end onto the same side of the first tape and that the adhesive surface of the first tape is exposed in steps so that prior to the fixing of the tape to the first paper web a longitudinal adhesive zone having a width smaller than the  
30 width of the adhesive surface of the tape is exposed, and the remainder of the adhesive surface is exposed after the removal of the end portion of the first web prior to the fixing of the tape to the second web.

35 With the method of the invention, a butt joint

covered on each side with one-sided tapes whose adhesive surface faces the paper is produced, and thus no outwardly exposed adhesive surfaces which could adhere to the other plies of the roll can be produced at the junction point. Furthermore, because of the butt joint between the paper webs the junction point is as thin as, or thinner than, the junction point produced with the previously known method, and the structure of the junction is gradually enlarging in thickness, wherefore the junction point will enter and leave the printing rolls softly.

To produce the butt joint, the preferable procedure is that the adhesive zone located adjacent the longitudinal edge of the tape which is remote from the end edge of the first paper web is exposed first, and thereafter the adhesive zone adjacent the opposite longitudinal edge is exposed.

The invention also relates to a tape for joining paper webs, one side of said tape having an adhesive surface covered with a removable protective film. The tape according to the invention is characterized in that the protective film comprises two longitudinal parts which can be separately removed from the adhesive surface.

In order that the protective film for the tape would be easily removable in two steps, according to one embodiment of the invention the protective film has a longitudinal slot or weakening line which separates the different parts of the film. In order for both paper webs to adhere to the tape equally strongly, it is preferred that the parts of the film are substantially equally broad and that the combined width thereof corresponds to the width of the tape.

One advantageous embodiment of the invention is explained more closely in the following with reference

to the accompanying drawing wherein

Figures 1 to 6 illustrate the different steps of the method of the invention,

Figure 7 shows a cross-section of a produced  
5 junction,

Figure 8 shows a top view of a tape used in the method, and

Figure 9 shows a magnified cross-section of the middle portion of the tape.

10 When a defective point, such as a hole or a point deviating in colour from the other parts of the web, is found in the paper web to be handled, this point is removed by cutting the paper web on both sides of the defective point, whereafter the paper webs are  
15 again joined by means of a tape.

The method of the invention is explained in the following with reference to Figures 1 to 6. In accordance with Figure 1, one takes a one-sided tape 1 as shown in Figures 8 and 9, whereof a longitudinal zone  
20 of the adhesive surface 2 is exposed, the width of said zone being substantially half of the width of the tape and being delimited by that edge of the tape which is remote from the end edge 4 of the first paper web 3. When the tape 1 is fastened to the paper web 3 by means  
25 of the adhesive zone 2, the end portion of the paper web which is located between the end edge 4 and the edge of the adhesive zone 2 which is closest to this end edge is torn off from the paper web, whereby the situation shown in Figure 2 is created. The tearing is  
30 done by hand, and it is made possible by the portion 5 of the protective film which still partly covers the tape. The removed part of the protective film is indicated by reference numeral 6.

When the paper web 3 is fixed to the tape 1,  
35 part 5 of the protective film is removed from the

adhesive surface 2 of the tape, whereby a second longitudinal zone of the adhesive surface is exposed. Thereafter the second paper web 7 is fixed to the second adhesive zone of the tape similarly as web 3, and also in this case the end portion of the web is torn off as shown in Figure 4. The accurate tearing, i.e. trimming, of the end portion is now made possible by the edge of the first torn web. Thus both ends are accurately laid face to face without gaps or overlapping paper. The result is a butt joint between the paper webs 3,7 as shown in Figure 5, wherein the end edges of the webs are face to face, fixed to the same one-sided tape 1. Finally, the junction is covered by an one-sided tape 8 from the side opposite tape 1. The tape 8 is preferably substantially narrower than tape 1. After the tapes have been cut, the junction shown in Figure 7 is ready.

The tape used in the method of the invention has been shown more closely in Figures 8 and 9. The adhesive surface 2 of the one-sided tape is covered by parts 5,6 of the protective film, which in the shown embodiment are equally broad and whose combined width corresponds to the width of the tape 1. There is a slot 9 between parts 5,6 of the protective film, on account of which parts 5,6 can be removed from the tape independently and at separate points of time. Both the slot 9 and parts 5, 6 of the protective film are continuous in the longitudinal direction of the tape and extend to the edges of the tape. The bearing layer of the tape is indicated with the reference numeral 10 in Figure 9.

The above presents a preferred embodiment of the method of the invention and the tape used therein, and it is obvious that the invention may differ in its details considerably from what has been presented

above. Thus the slot 9 may be replaced for instance by a weakening line or some other arrangement which makes it possible to remove the protective film in steps from the tape. Further, it is to be noted that the tape need  
5 not be fixed exactly transverse to the paper webs, but often it is advantageous to fix it to the webs somewhat diagonally, as has been shown in the figures, whereby the impact on the printing roll is weakened. The invention is particularly suitable for use in connection  
10 with thin and thick paper qualities, whereby the most suitable thickness for the bearing layer 10 of the tape is selected in view of the required tensile strength and the total thickness of the junction, but it can also be used in connection with other equivalent materials.  
15 The width of parts 5,6 of the protective film can be varied according to need.



## C l a i m s :

1. A method for joining paper webs by means of tapes provided with a protective film, in accordance with which an adhesive surface (2) of a first tape (1) is exposed, said tape is attached substantially transversely to a first web (3) at a distance from the end edge (4) of the web so that it will extend from one longitudinal edge of the web to the other, the end portion of the web between the tape (1) and the end edge (4) of the web is removed, the same steps are repeated for a second web (7), and the junction point between the webs is covered with a second tape (8), c h a r a c t e r i z e d in that both paper webs (3, 7) are fixed end to end onto the same side of the first tape (1) and that the adhesive surface (2) of the first tape is exposed in steps so that prior to the fixing of the tape to the first paper web (3) a longitudinal adhesive zone having a width smaller than the width of the adhesive surface (2) of the tape is exposed, and the remainder of the adhesive surface is exposed after the removal of the end portion of the first web (3) prior to the fixing of the tape to the second web (7).
2. A method as claimed in claim 1, c h a r a c t e r i z e d in that the adhesive zone located adjacent the longitudinal edge of the tape (1) which is remote from the end edge (4) of the first paper web (3) is exposed first, and thereafter the adhesive zone adjacent the opposite longitudinal edge is disposed.
3. A tape for joining paper webs, one side of said tape (1) having an adhesive surface (2) covered with a removable protective film (5, 6), c h a r a c t e r i z e d in that the protective film comprises two longitudinal parts (5, 6) which can be separately removed from the adhesive surface.

4. A tape as claimed in claim 3, c h a r a c -  
t e r i z e d in that the protective film has a lon-  
gitudinal slot (9) or weakening line separating the  
different parts (5, 6) of the film from one another.

5 5. A tape as claimed in claim 3, c h a r a c -  
t e r i z e d in that the parts (5, 6) of the film  
are substantially equally broad and that the combined  
width thereof corresponds to the width of the tape (1).

## AMENDED CLAIMS

[received by the International Bureau on 23 May 1990 (23.05.90)  
original claims 3-5 replaced by amended claim 3;  
claims 1 and 2 unchanged (1 page)]

1. A method for joining paper webs by means of  
tapes provided with a protective film, in accordance  
5 with which an adhesive surface (2) of a first tape (1)  
is exposed, said tape is attached substantially trans-  
versely to a first web (3) at a distance from the end  
edge (4) of the web so that it will extend from one  
longitudinal edge of the web to the other, the end  
10 portion of the web between the tape (1) and the end  
edge (4) of the web is removed, the same steps are  
repeated for a second web (7), and the junction point  
between the webs is covered with a second tape (8),  
c h a r a c t e r i z e d in that both paper webs (3,  
15 7) are fixed end to end onto the same side of the first  
tape (1) and that the adhesive surface (2) of the first  
tape is exposed in steps so that prior to the fixing of  
the tape to the first paper web (3) a longitudinal  
adhesive zone having a width smaller than the width of  
20 the adhesive surface (2) of the tape is exposed, and  
the remainder of the adhesive surface is exposed after  
the removal of the end portion of the first web (3)  
prior to the fixing of the tape to the second web (7).

2. A method as claimed in claim 1, c h a r -  
25 a c t e r i z e d in that the adhesive zone located  
adjacent the longitudinal edge of the tape (1) which is  
remote from the end edge (4) of the first paper web (3)  
is exposed first, and thereafter the adhesive zone  
adjacent the opposite longitudinal edge is disposed.

3. Use of a tape comprising an adhesive surface (2)  
30 covered with a removable protective film provided with a  
longitudinal slot (9) or weakening line dividing the pro-  
tective film into two longitudinal parts (5,6) which can be  
separately removed from the adhesive surface (2), for join-  
35 ing the ends of two paper webs (3,7) to each other.

FIG. 1

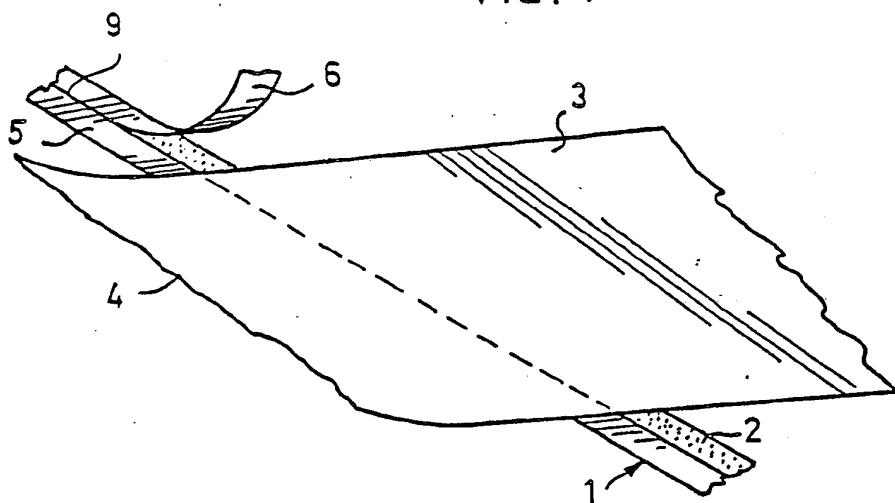


FIG. 2

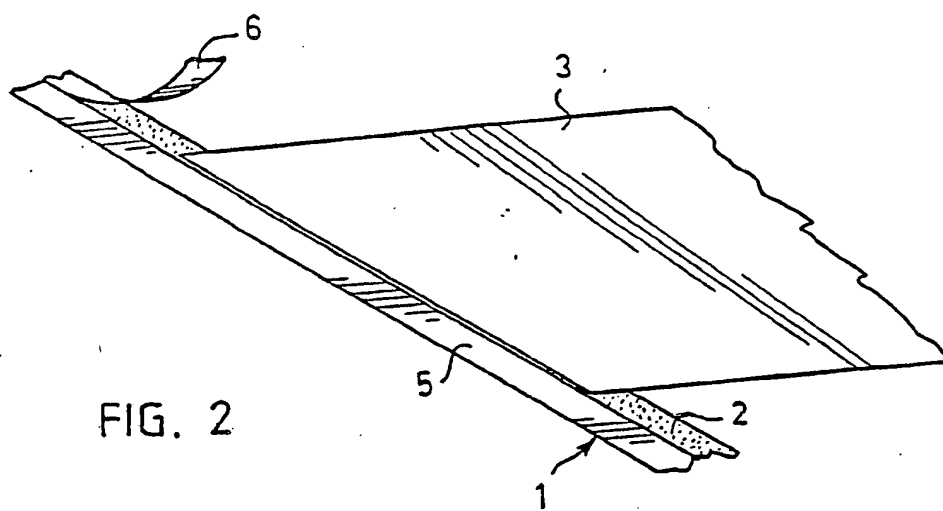


FIG. 3

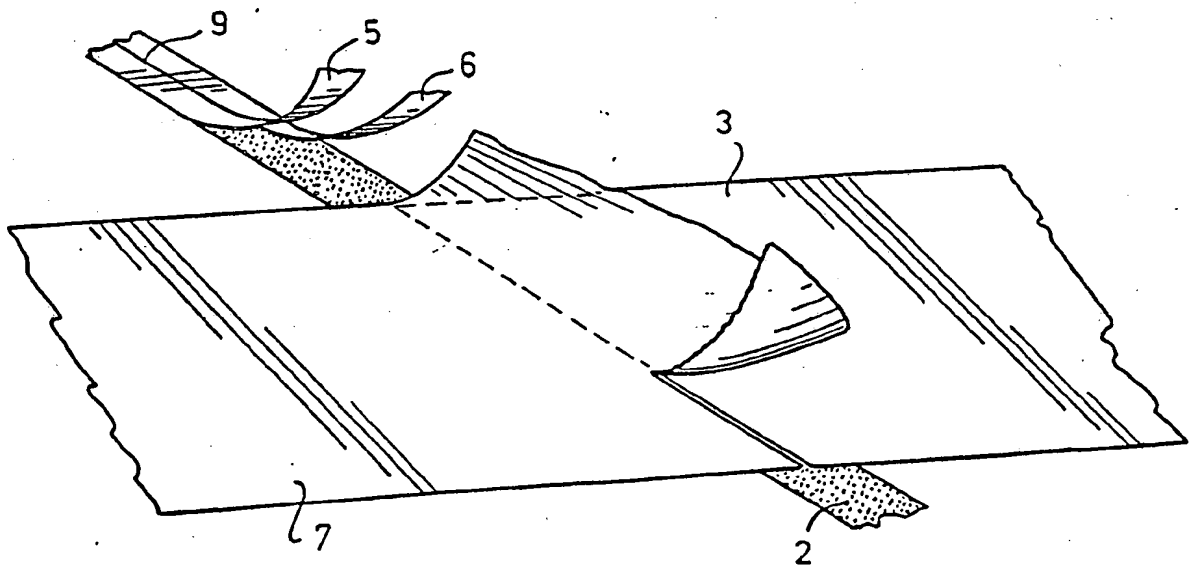
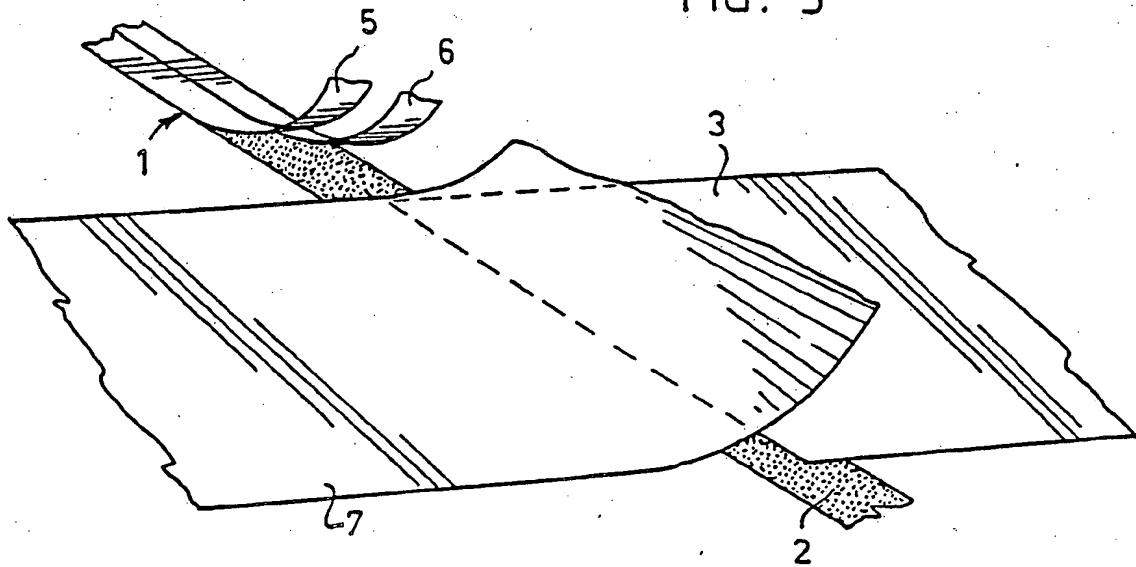


FIG. 4

3/3

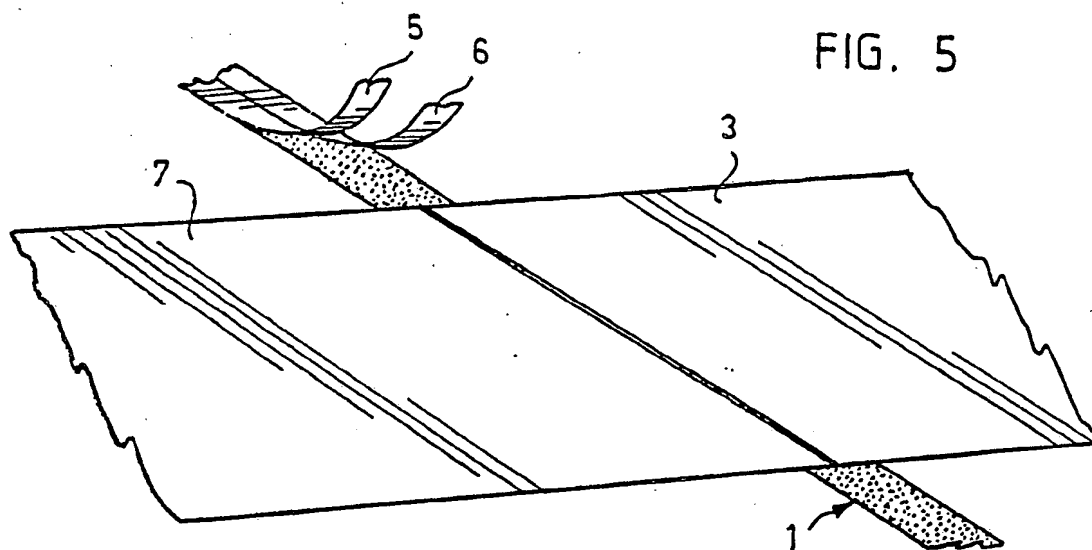


FIG. 5

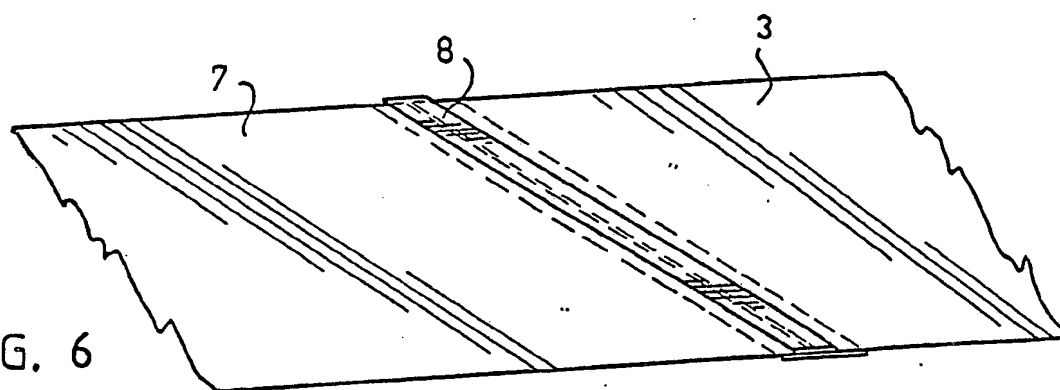


FIG. 6

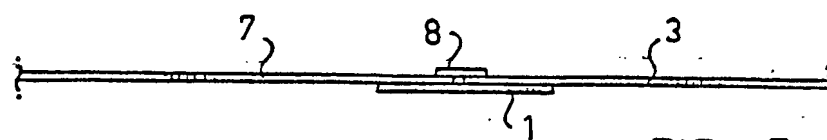


FIG. 7

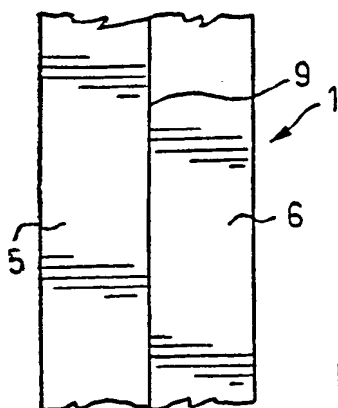


FIG. 8

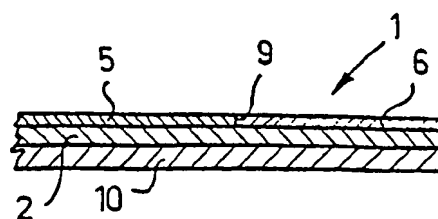


FIG. 9

# INTERNATIONAL SEARCH REPORT

International Application No. PCT/FI 90/00011

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) * According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: B 31 F 5/06, C 09 J 7/02						
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; font-size: small;">Minimum Documentation Searched 7</div> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">Classification System  </td> <td style="width: 50%; border: none;">Classification Symbols</td> </tr> <tr> <td style="border: none; padding-top: 10px;">IPC5</td> <td style="border: none; padding-top: 10px;">B 31 B; B 31 F; B 65 H; C 09 J</td> </tr> </table> <div style="text-align: center; font-size: x-small; margin-top: 5px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *</div>			Classification System	Classification Symbols	IPC5	B 31 B; B 31 F; B 65 H; C 09 J
Classification System	Classification Symbols					
IPC5	B 31 B; B 31 F; B 65 H; C 09 J					
SE,DK,FI,NO classes as above						
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> *						
Category *	Citation of Document, ** with indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13				
A	DE, A, 2123880 (GROSSARTH, KURT) 23 November 1972, see the whole document --	1,2				
A	US, A, 4264401 (GANZ) 28 April 1981, see the whole document --	1,2				
A	US, A, 4645558 (SATO) 24 February 1987, see the whole document --	1,2				
A	US, A, 4348440 (KRIOZERE) 7 September 1982, see the whole document	1,2				
X	--	3-5				
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p style="font-size: x-small;">* Special categories of cited documents: 10</p> <p style="font-size: x-small;">"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p style="font-size: x-small;">"E" earlier document but published on or after the international filing date</p> <p style="font-size: x-small;">"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p style="font-size: x-small;">"O" document referring to an oral disclosure, use, exhibition or other means</p> <p style="font-size: x-small;">"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p style="font-size: x-small;">"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p style="font-size: x-small;">"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p style="font-size: x-small;">"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p style="font-size: x-small;">"&amp;" document member of the same patent family</p> </div> </div>						
<b>IV. CERTIFICATION</b>						
Date of the Actual Completion of the International Search 19th April 1990		Date of Mailing of this International Search Report 1990 -04- 23				
International Searching Authority SWEDISH PATENT OFFICE		Signature of Authorized Officer Björn Lindkvist <i>Björn Lindkvist</i>				

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
X	SE, A, 8305945 (MÖLNLYCKE AB) 29 April 1985, see page 1, line 18 - line 20 --	3-5
X	DE, A, 1043556 (HEINRICH HERMANN PAPIERWARENFABRIK) 13 November 1958, see column 2, line 5 - line 7 -- -----	3-5



**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO. PCT/FI 90/00011**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A- 2123880	72-11-23	NONE	
US-A- 4264401	81-04-28	NONE	
US-A- 4645558	87-02-24	DE-A- 3469431	88-03-31
		EP-A-B- 0142909	85-05-29
		JP-A- 60066130	85-04-16
US-A- 4348440	82-09-07	NONE	
SE-A- 8305945	85-04-29	DE-A- 3439332	85-05-09
		FR-A- 2553995	85-05-03
		GB-A- 2148125	85-05-30
DE-A- 1043556	58-11-13	NONE	

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